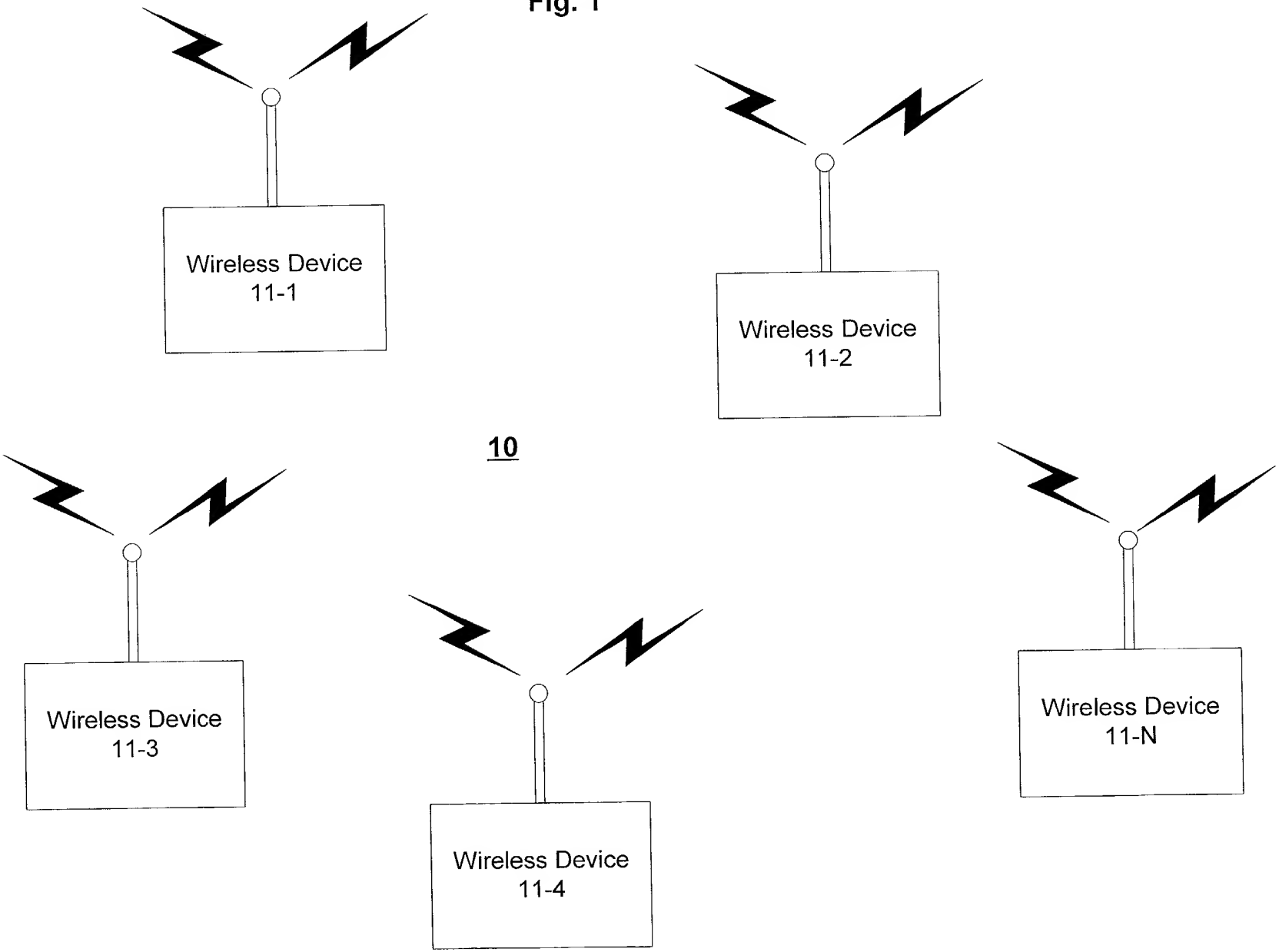
Fig. 1


Wireless Device
11-1
Wireless Device
11-2
10
Wireless Device
11-3
Wireless Device
11-4
Wireless Device
11-N

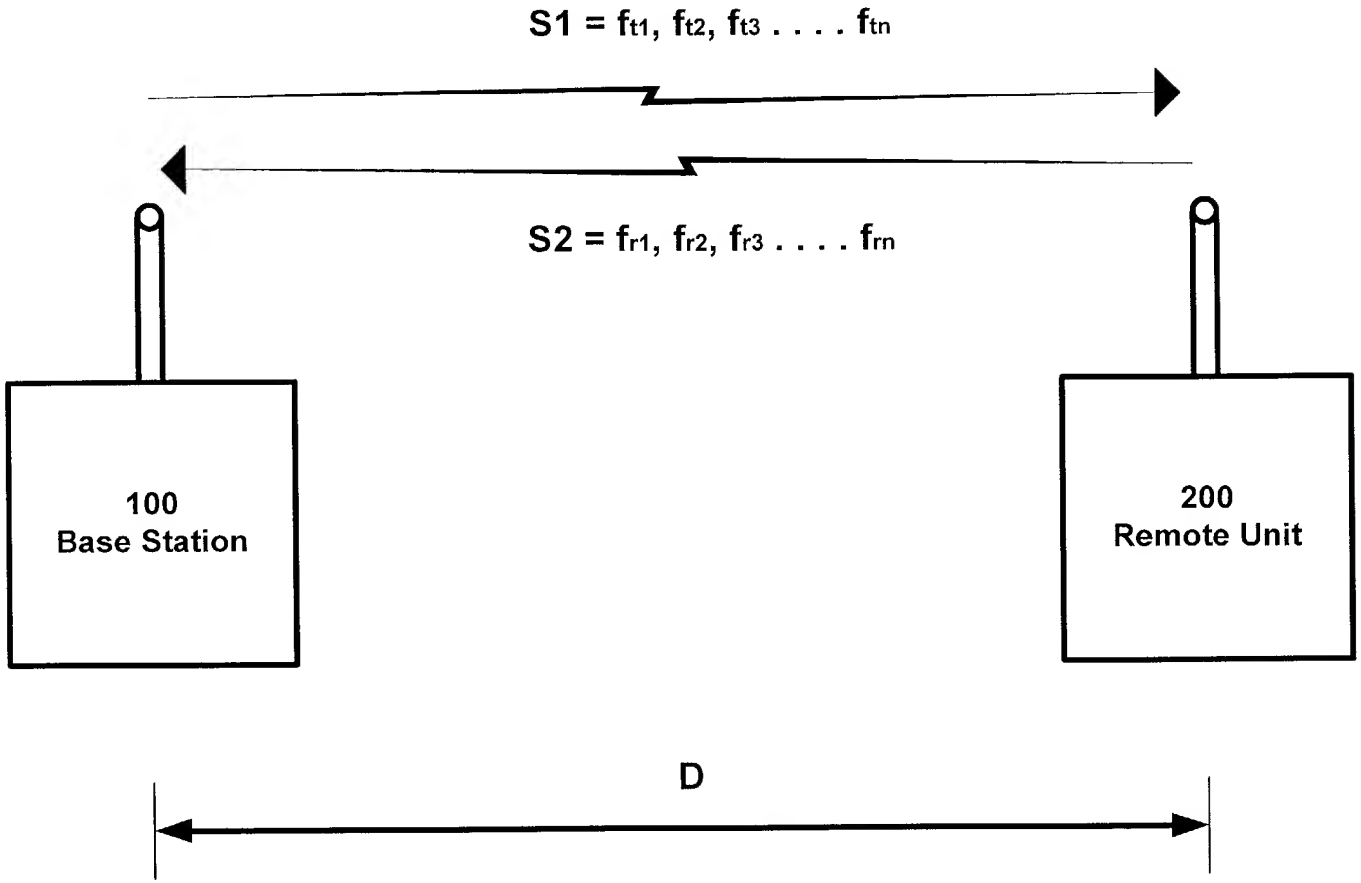

S1 = ft1, ft2, ft3 . . . . ftn
S2 = fr1, fr2, fr3 . . . . frn
100
Base Station
200
Remote Unit
D

Fig. 2

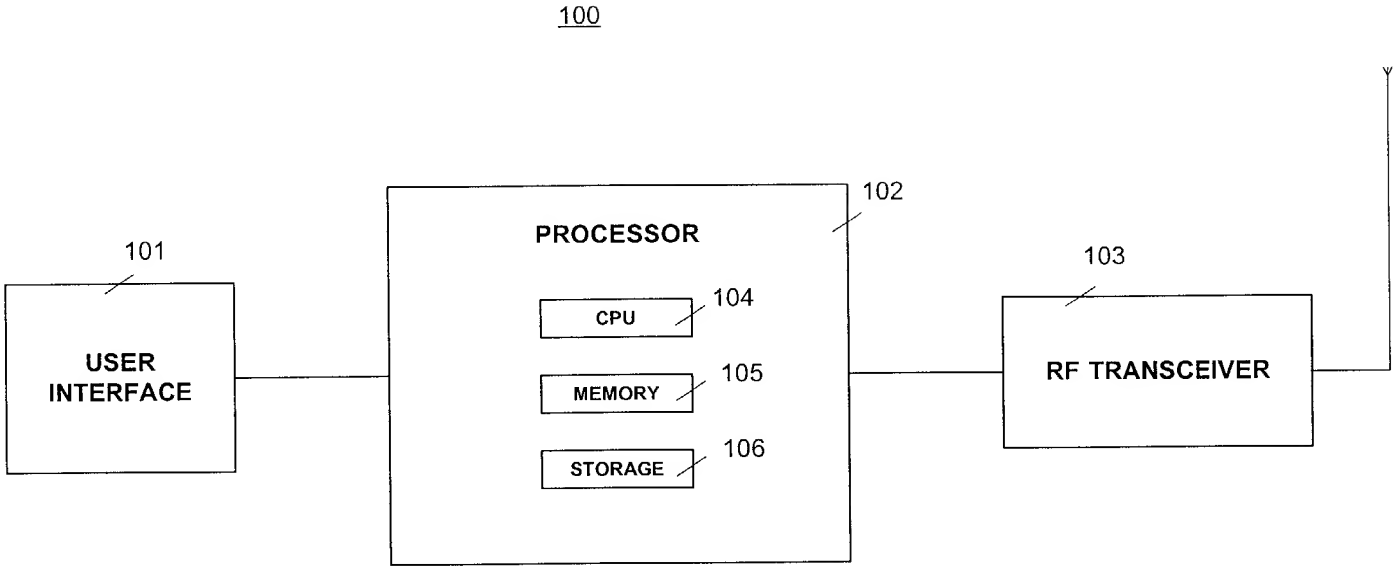

100
101
USER INTERFACE
PROCESSOR
102
CPU
104
MEMORY
105
STORAGE
106
103
RF TRANSCEIVER

FIG. 3A

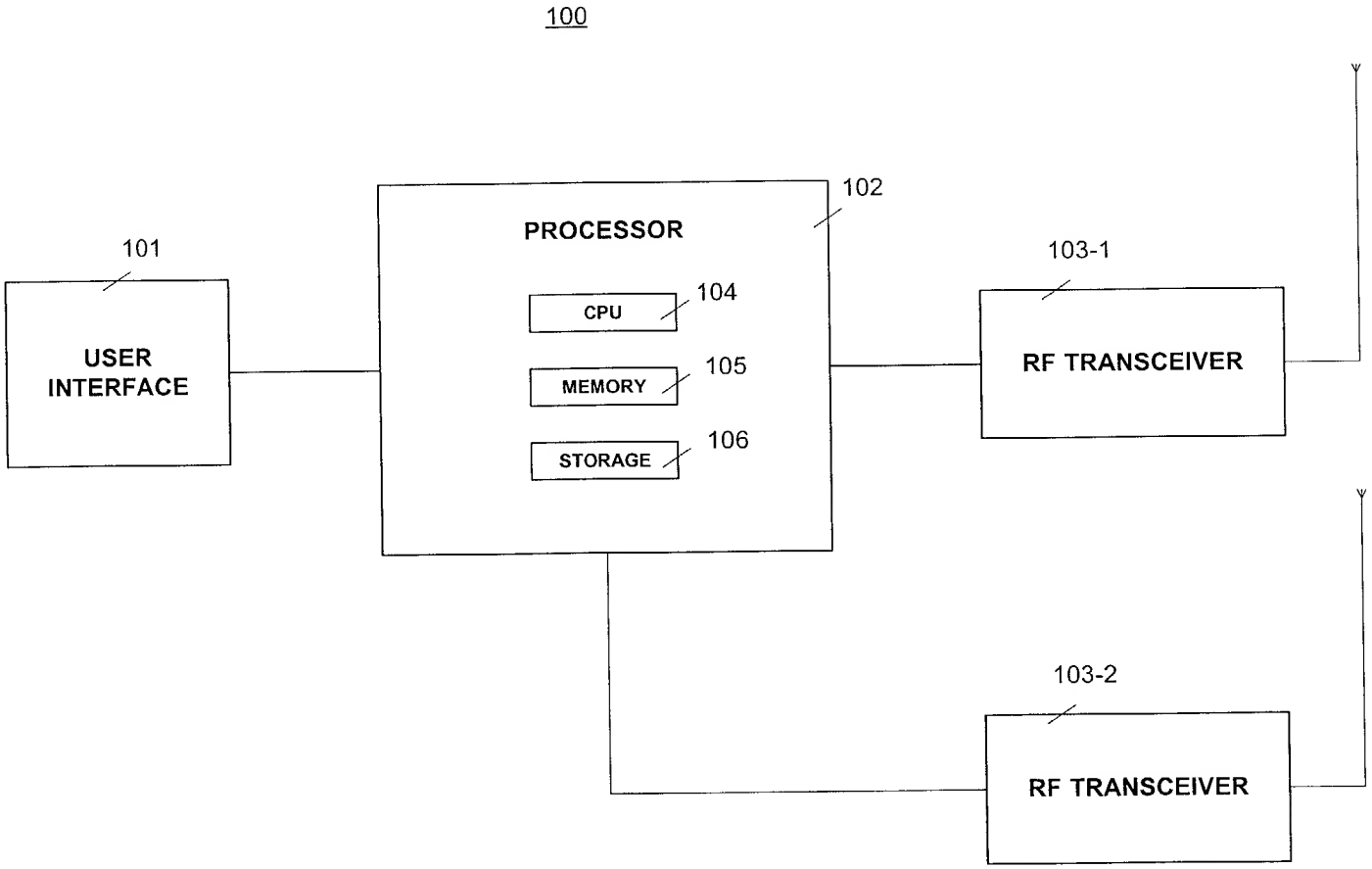

100
101
USER INTERFACE
102
PROCESSOR
CPU
104
MEMORY
105
STORAGE
106
103-1
RF TRANSCEIVER
103-2
RF TRANSCEIVER

FIG. 3B

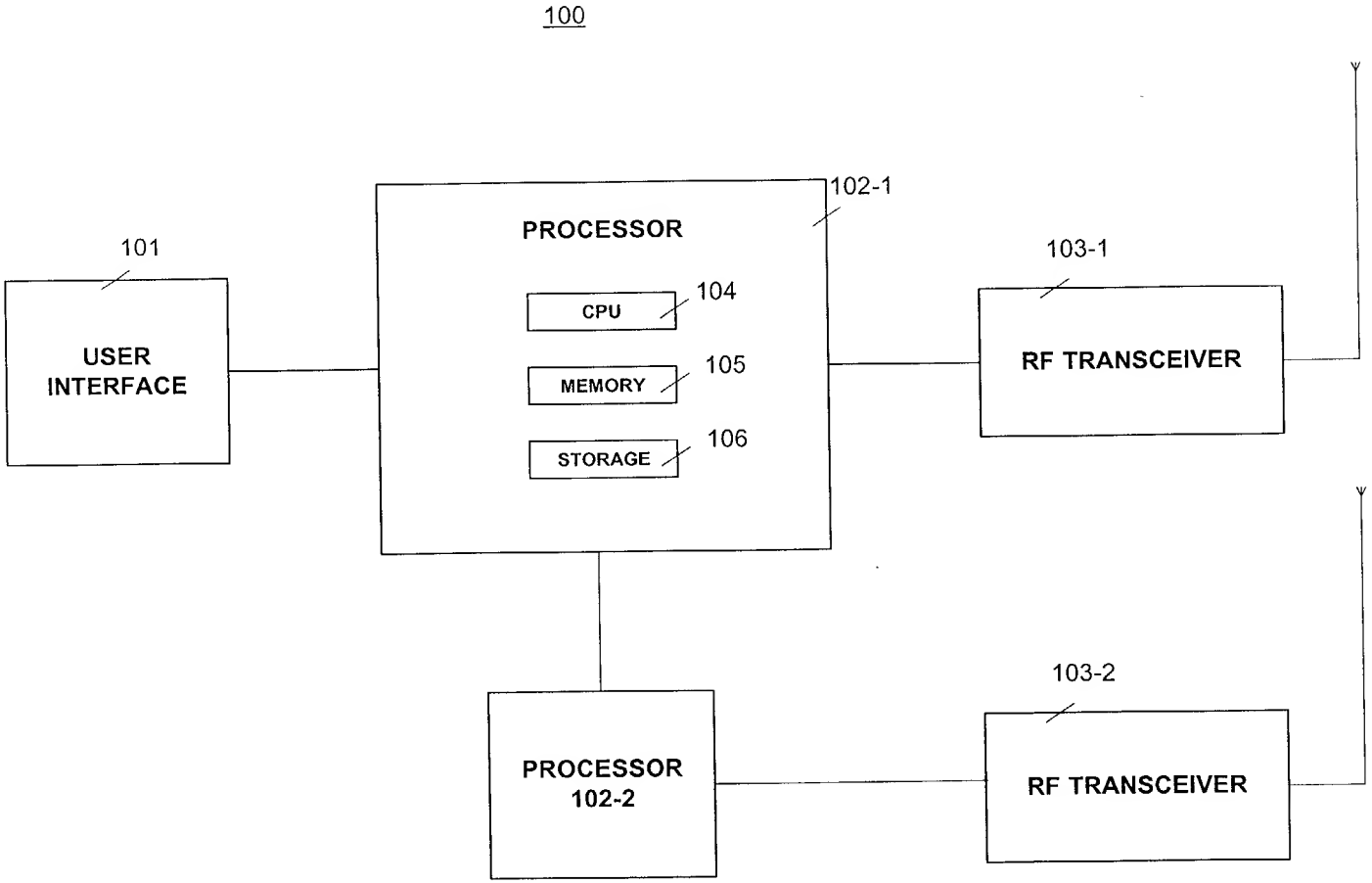

100
101
USER INTERFACE
PROCESSOR
102-1
CPU
104
MEMORY
105
STORAGE
106
103-1
RF TRANSCEIVER
PROCESSOR 102-2
103-2
RF TRANSCEIVER

FIG. 3C

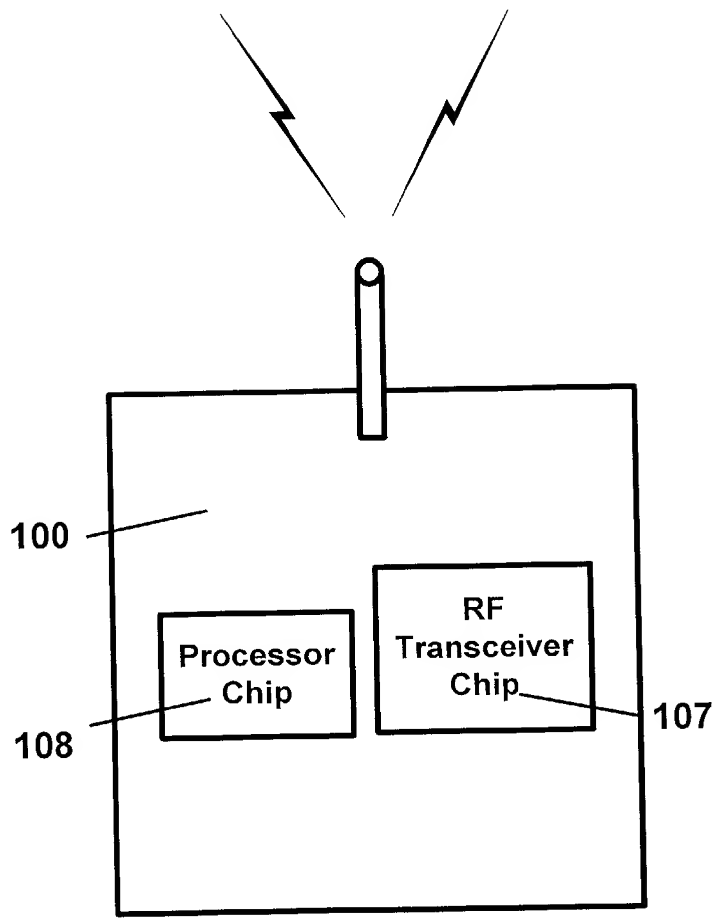

100
Processor
Chip
108
RF
Transceiver
Chip
107

Fig. 4A

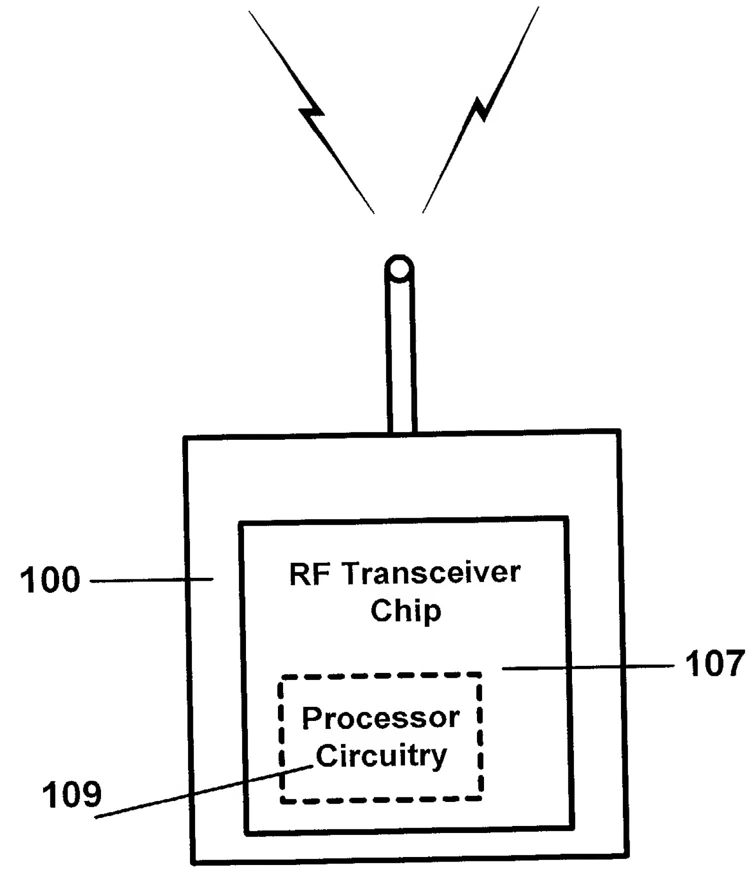

100
RF Transceiver
Chip
107
Processor
Circuitry
109

Fig. 4B

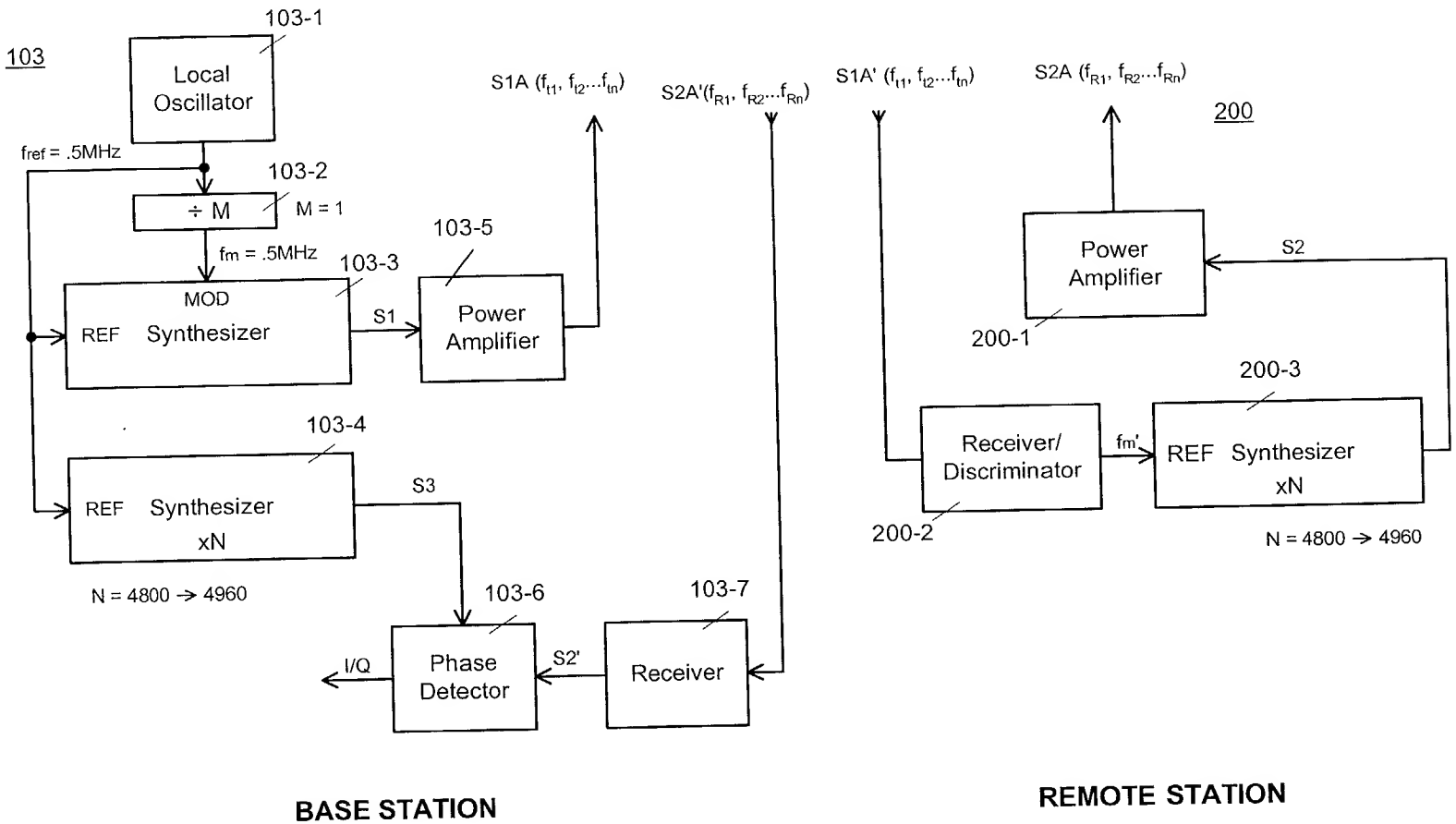


FIG. 5

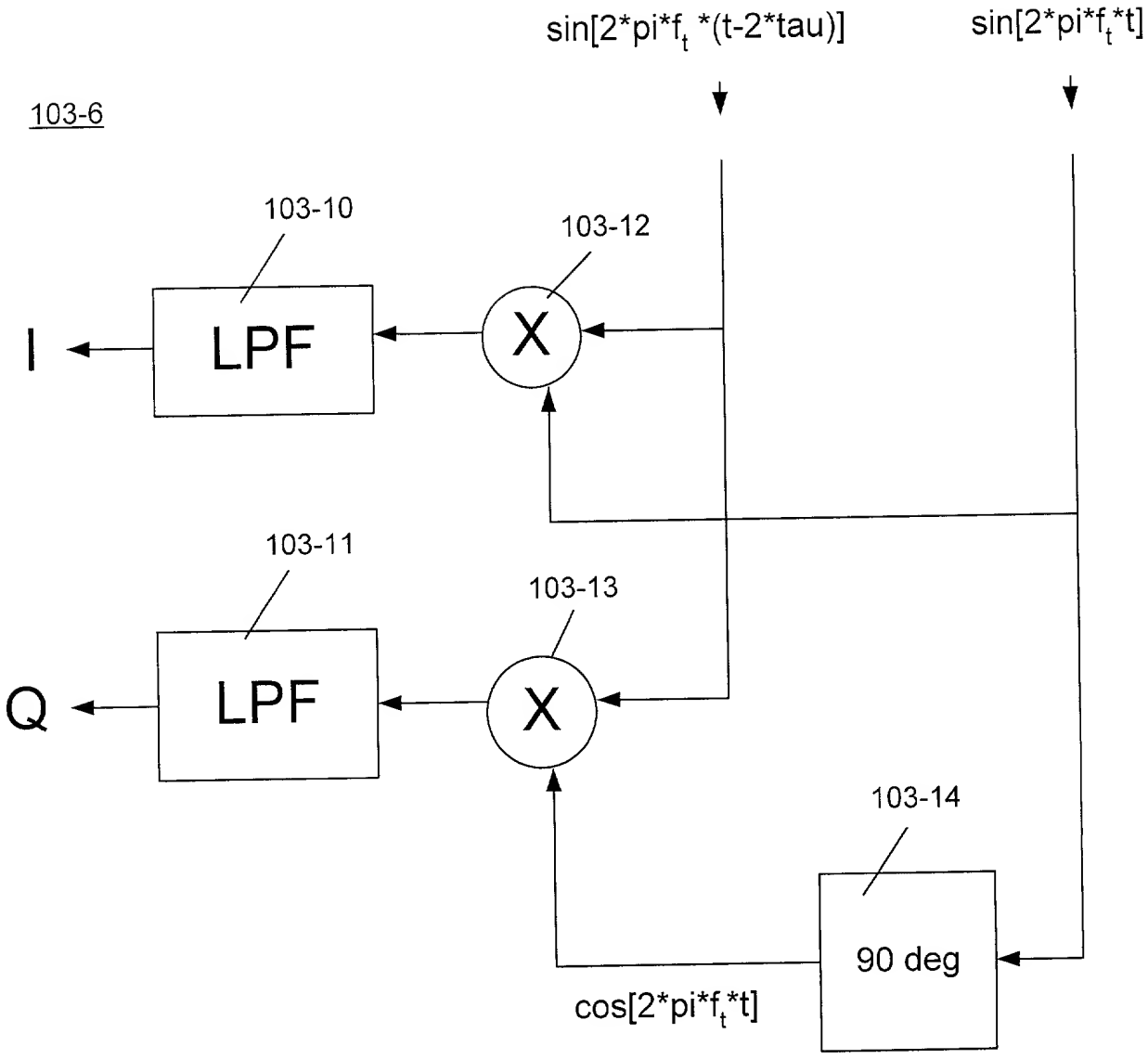

sin[2*pi*f_t *(t-2*tau)]
sin[2*pi*f_t*t]
103-6
103-10
103-12
I
LPF
X
103-11
103-13
Q
LPF
X
103-14
90 deg
cos[2*pi*f_t*t]

Fig. 6

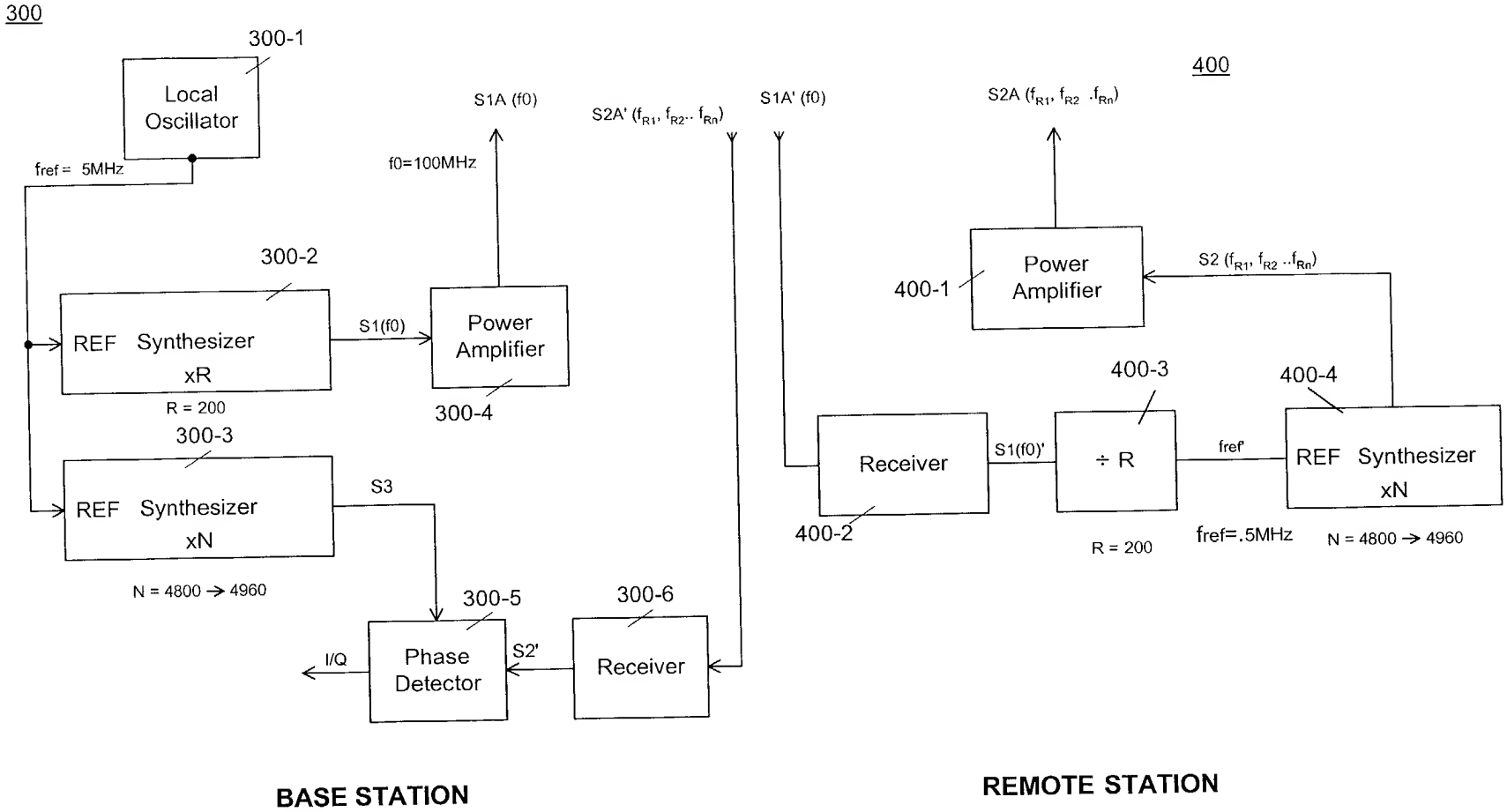
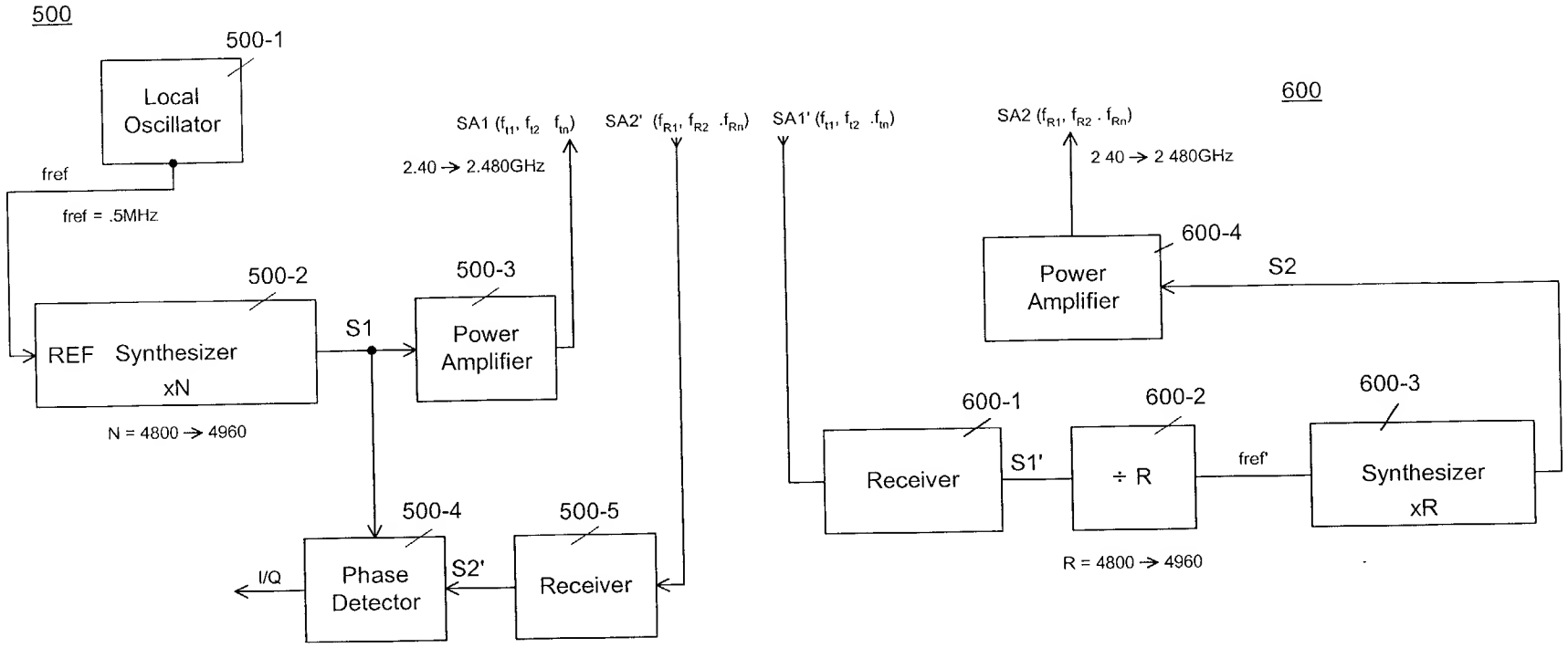


FIG. 7



BASE STATION **FIG. 8** **REMOTE STATION**

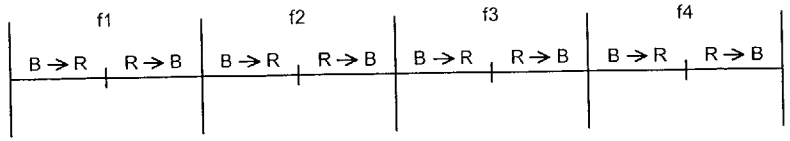
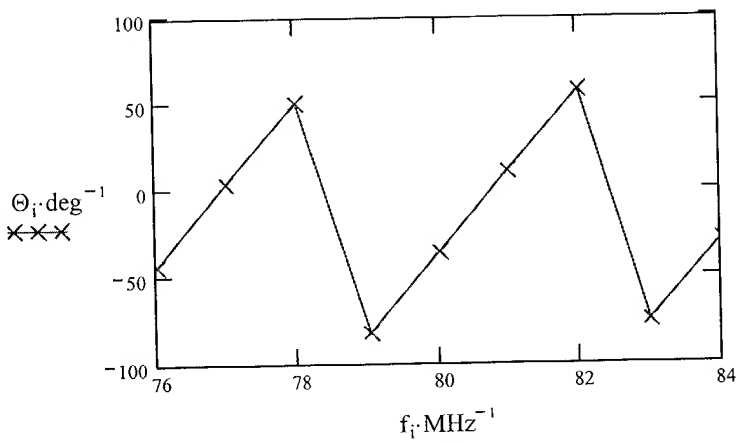


FIG. 9



$$\Theta \cdot \mathrm{deg}^{-1} = \begin{pmatrix} -43\ 2 \\ 3.6 \\ 50.4 \\ -82.8 \\ -36 \\ 10.8 \\ 57.6 \\ -75.6 \\ -28.8 \end{pmatrix}$$

Fig. 10

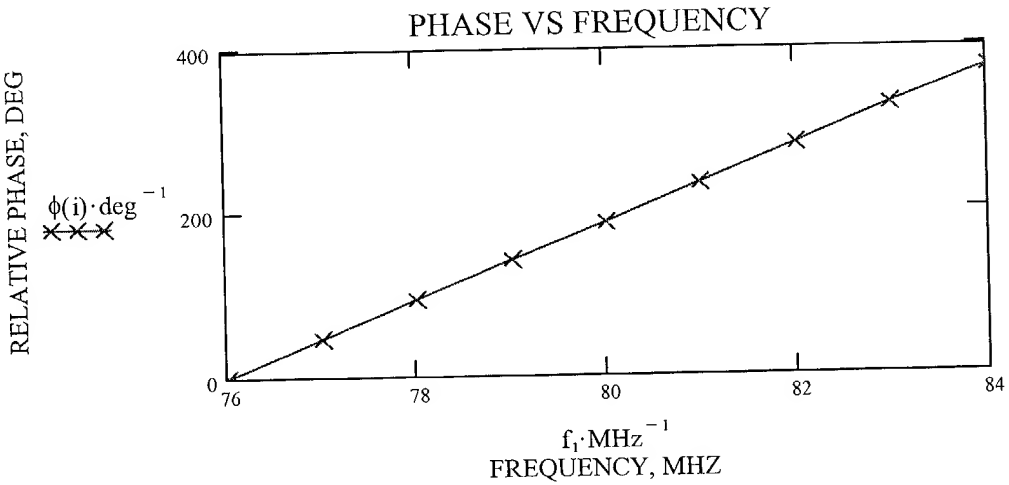

PHASE VS FREQUENCY
RELATIVE PHASE, DEG
400
200
0
$\phi(i)\cdot deg^{-1}$
76
78
80
82
84
$f_1\cdot MHz^{-1}$
FREQUENCY, MHZ

Fig. 11

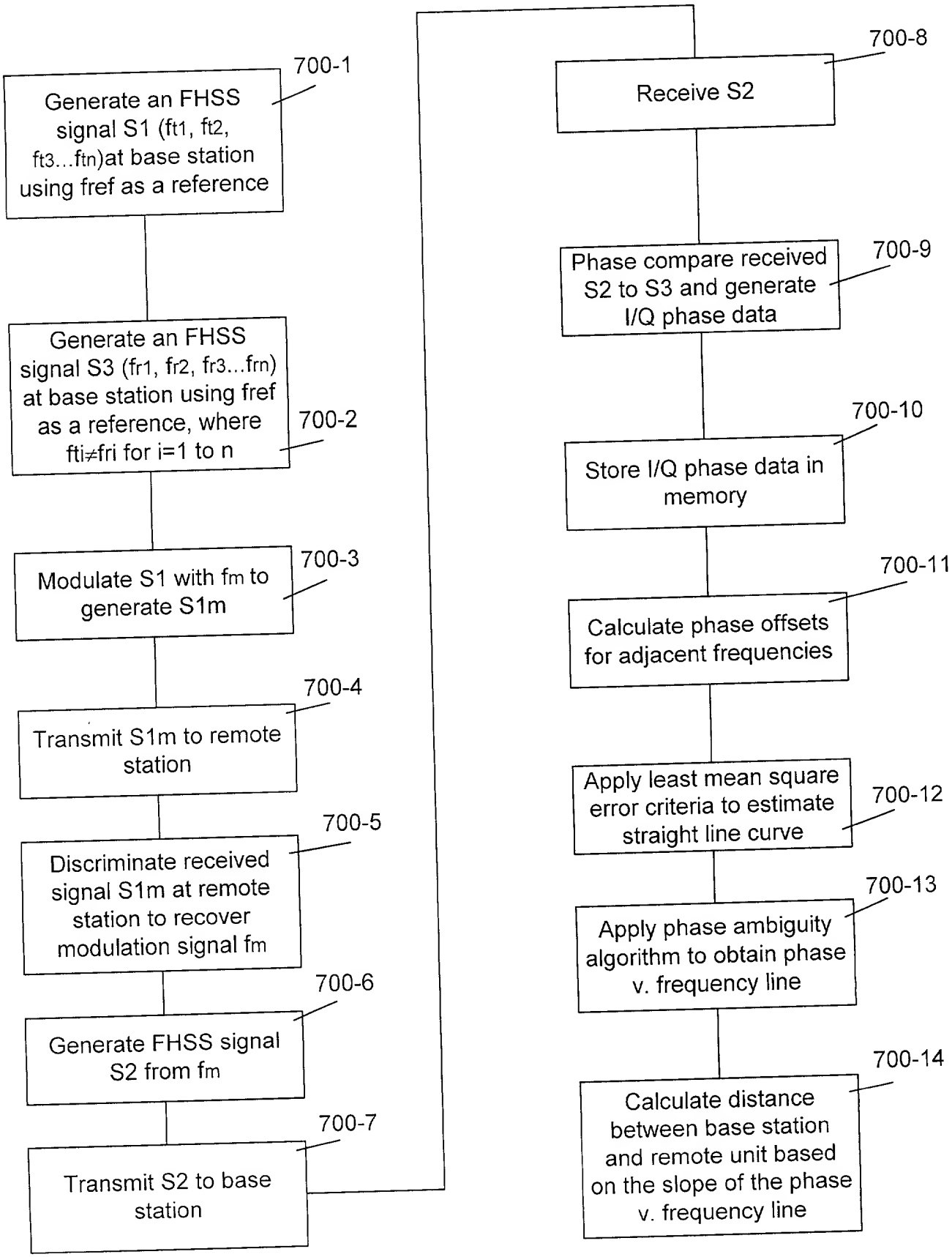

700-1
Generate an FHSS signal S1 (ft1, ft2, ft3...ftn)at base station using fref as a reference
Generate an FHSS signal S3 (fr1, fr2, fr3...frn) at base station using fref as a reference, where fti≠fri for i=1 to n
700-2
Modulate S1 with fm to generate S1m
700-3
Transmit S1m to remote station
700-4
Discriminate received signal S1m at remote station to recover modulation signal fm
700-5
Generate FHSS signal S2 from fm
700-6
Transmit S2 to base station
700-7
Receive S2
700-8
Phase compare received S2 to S3 and generate I/Q phase data
700-9
Store I/Q phase data in memory
700-10
Calculate phase offsets for adjacent frequencies
700-11
Apply least mean square error criteria to estimate straight line curve
700-12
Apply phase ambiguity algorithm to obtain phase v. frequency line
700-13
Calculate distance between base station and remote unit based on the slope of the phase v. frequency line
700-14

Fig. 12

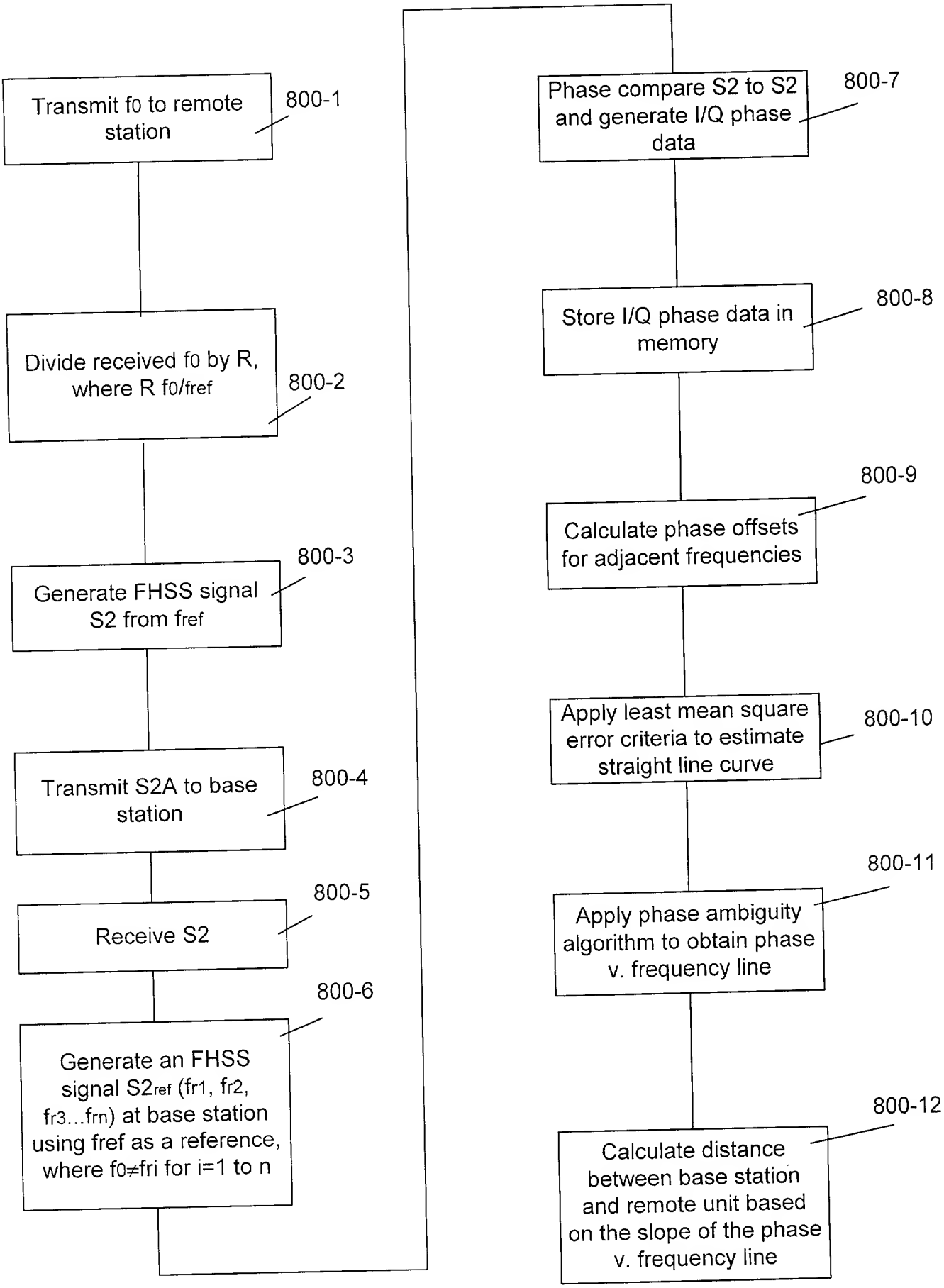

Transmit f0 to remote station
800-1
Divide received f0 by R, where R f0/fref
800-2
Generate FHSS signal S2 from fref
800-3
Transmit S2A to base station
800-4
Receive S2
800-5
Generate an FHSS signal S2ref (fr1, fr2, fr3...frn) at base station using fref as a reference, where f0≠fri for i=1 to n
800-6
Phase compare S2 to S2 and generate I/Q phase data
800-7
Store I/Q phase data in memory
800-8
Calculate phase offsets for adjacent frequencies
800-9
Apply least mean square error criteria to estimate straight line curve
800-10
Apply phase ambiguity algorithm to obtain phase v. frequency line
800-11
Calculate distance between base station and remote unit based on the slope of the phase v. frequency line
800-12

Fig. 13

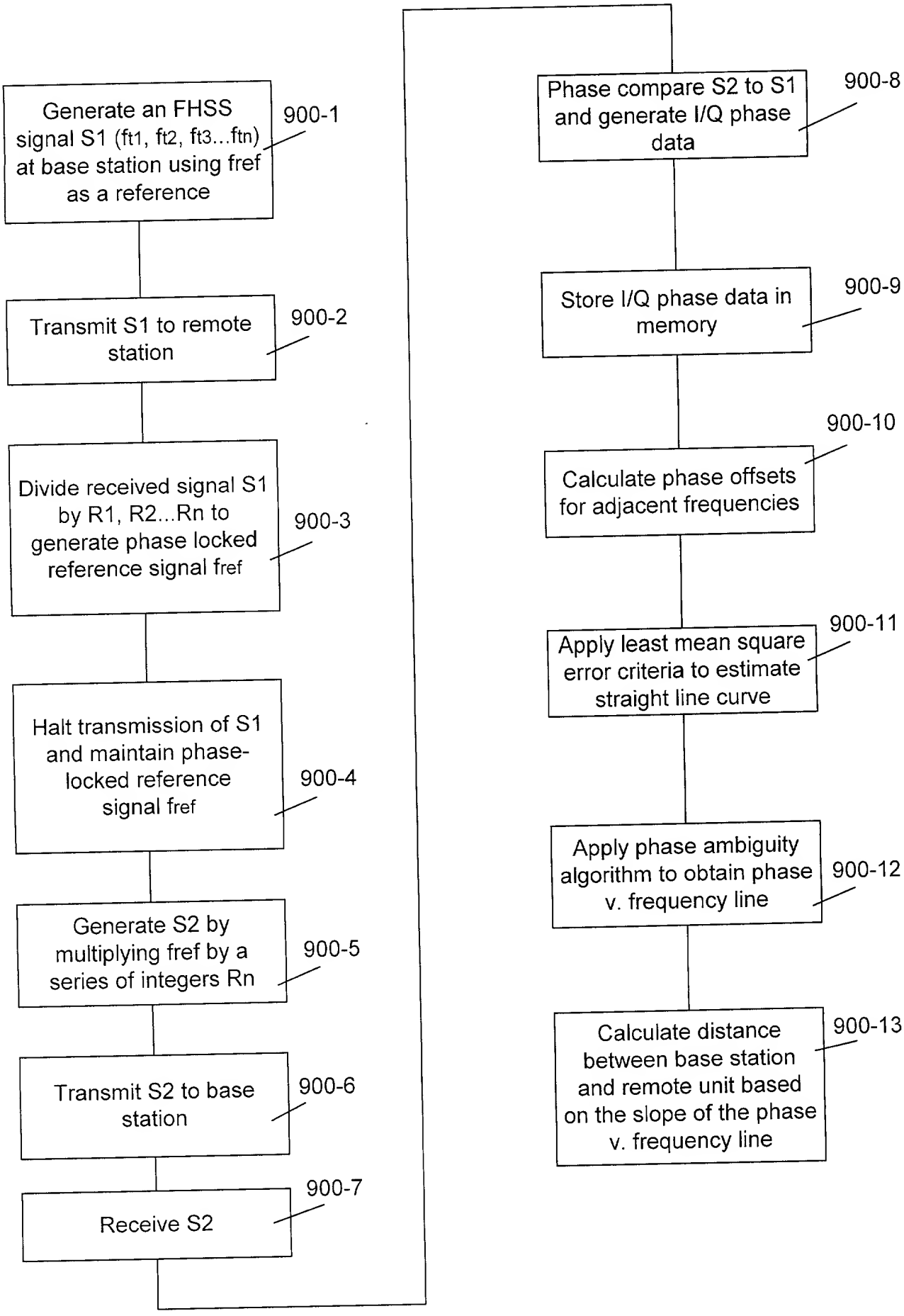

Generate an FHSS signal S1 (ft1, ft2, ft3...ftn) at base station using fref as a reference
900-1
Transmit S1 to remote station
900-2
Divide received signal S1 by R1, R2...Rn to generate phase locked reference signal fref
900-3
Halt transmission of S1 and maintain phase-locked reference signal fref
900-4
Generate S2 by multiplying fref by a series of integers Rn
900-5
Transmit S2 to base station
900-6
Receive S2
900-7
Phase compare S2 to S1 and generate I/Q phase data
900-8
Store I/Q phase data in memory
900-9
Calculate phase offsets for adjacent frequencies
900-10
Apply least mean square error criteria to estimate straight line curve
900-11
Apply phase ambiguity algorithm to obtain phase v. frequency line
900-12
Calculate distance between base station and remote unit based on the slope of the phase v. frequency line
900-13

Fig. 14